

REMARKS

In the Office Action mailed on December 28, 2007, claims 1-19 were rejected under at least one of 35 U.S.C. §112, second paragraph and 35 U.S.C. § 103.

In this Amendment and Response, Applicants have amended claims 1 and 8-19 to address informalities. Applicants respectfully submit that no new matter has been introduced by these amendments. In view of the amendments and the following remarks, Applicants respectfully request reconsideration and withdrawal of all rejections.

Rejection of Claims 1 and 8-19 under 35 U.S.C. §112, second paragraph

Claims 1 and 8 to 19 were rejected as being indefinite for failing to point out and distinctly claim the subject matter which Applicants regard as the invention. Specifically, claim 1 was rejected under 35 U.S.C. § 112, second paragraph for not clearly defining the S_c equation recited therein. Claims 8 to 19 were rejected as being indefinite for including improper multiple dependent claims and claim 19 was further rejected for reciting the limitation “type of oxide.”

In response, Applicants have amended claim 1 to include the recommended additional set of parenthesis that the Examiner believes to clarify the S_c equation. Applicants have also amended claims 8-19 to eliminate problematic or improper multiple dependent claims. Finally, Applicants have amended claim 19 to remove the allegedly indefinite phrase “type of.” Applicants believe that these amendments address and cure any and all concerns identified by the Examiner. As a result, Applicants request reconsideration and the withdrawal of all 35 U.S.C. §112, second paragraph rejections.

Rejection of Claims 1 to 19 under 35 U.S.C. §103

Claims 1 to 19 were rejected as being unpatentable over European patent 1004789 (hereinafter EP ‘789) or European patent 1213071 (hereinafter EP ‘071) in view of one or more of Japanese patent 52-111814 (hereinafter JP ‘814), US Patent No. 6,177,045 issued to Ecob et al (hereinafter Ecob), Soviet Union patent 1803460 (hereinafter SU’ 460), and Derwent publication NL 150847.

Applicants’ claim 1 is directed to a cast iron material that includes C, Si, Mn Cu, S, O₂, iron, and unavoidable impurities. In addition, the cast iron material of claim 1 can further

include P and one or more of Mo, La, Sr, Ni, V, Sn, N and Ce. The degree of saturation of the cast iron material of claim 1 is defined by $Sc = C\% / (4.26 - 0.3*(Si\% + P\%))$, and has a quantity of eutectic graphite MEG that is between or equal to 1.97% to 2.07% where $MEG = 2.25\% - 0.2Si\%$.

On page 3 of the Office Action, the Examiner argues that both EP '789 and EP '071 individual teach a cast iron alloy that in their broadest disclosures overlap the required amounts of C, Si, Mn, Cu, and S and that the missing required component of O₂ is taught by JP'814. On page 4 of the Office Action, the Examiner argues that Ecob, SU '460, and Derwent publication NL 150847 teach or suggest adding the optional elements Sr, Ni, N, or Ce which are not taught by either EP '789 or EP '071.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation to modify the references. Second, there must be a reasonable expectation of success. Lastly, all the words in a claim must be considered in judging the patentability of that claim against the prior art. M.P.E.P. 2143, 2143.01-2143.03. In the present case, the cited references fail to support a *prima facie* case of obviousness at least because there is no suggestion or motivation to modify the references in a way that results in Applicants' claimed invention with any reasonable expectation of success. (See, for example, *Takeda Chemical Industries, LTD. v. Alphapharm PTY., LTD*, 492 F.3d 1350, 1356-57, 83 U.S.P.Q.2d 1169 (Fed. Cir. 2008), which states that even after KSR, "in cases involving new chemical compounds, it remains necessary to identify some reason that would have led [one skilled in the art] to modify a known compound in a particular manner to establish *prima facie* obviousness of a new claimed compound.) Moreover, the combination of the references results in a material that is different (i.e., includes extra elements not required by Applicants' claimed cast iron material) and in accordance with MPEP 2144.04 II, this fact is an indicia of unobviousness.

Applicants respectfully submit that there is no suggestion, motivation, or reason to combine either EP '789 or EP '071 with the teaching of JP '814 to obtain Applicants' inventive cast iron material. Specifically, the Office Action alleges that the recitation of 0.003 to 0.007% of oxygen is not a patentable difference as JP '814 teaches that small amounts of oxygen to grey cast iron promotes a high graphitization tendency and high impact toughness. However, Applicants submit that JP '814 discloses that the high graphitization tendency and high impact

toughness is produced not only through the inclusion of O₂, but through a balance between the amount of O₂ with S followed by an Al treatment.

While EP '789 and EP '071 disclose a Mn range that in their broadest interpretation encompasses Applicants' claimed range, neither reference does so in combination with O₂, which Applicant has identified as an important element to be in a correct concentration with respect to the high Mn concentration. Specifically, Applicants teach that a Mn content in the range of 0.4% to 0.7% assists the formation of pearlite. (See page 8 of Applicants' specification). In addition, Applicants have found that the oxygen content controls the speed and the extent of nucleation, which is also a factor in the formation of pearlite. Specifically, on pages 11 and 12 of the specification, Applicants teach that in the inventive cast iron alloy an increase in the oxygen content leads to rapid particle growth, while lower oxygen contents results in less growth. Applicants have identified the range of 0.003 to 0.007% as the range of oxygen that in connection with 0.4% to 0.7% Mn obtains the desired structure.

Neither EP '789 nor EP '071 has provided any teaching or suggestion that a high Mn content together with a specific range of O₂ is desirable, nor has either reference identified the combination of high Mn and O₂ as a factor to be optimized to provide a successful result. That is, EP '789 fails to teach the presence of O₂ at all and EP '071 provides a single embodiment which includes O₂ but at the same time discloses an amount of Mn which is below Applicants' claimed range for forming pearlite. As a result, these references fail to provide any expectation of success of a modification of the O₂ content in a high Mn content cast iron alloy. (See MPEP 2144.05 II B, which requires the identification of a result-effective variable capable of being optimized as a basis for *prima facie* obviousness.)

JP '814 does not provide the necessary reason to modify the references to obtain Applicants' claimed cast iron composition, rather JP '814 illustrates why one skilled in the art would not find an expectation of success for the following reasons. First, the English abstract of JP '814 is completely silent with respect to the presence of Mn in the cast alloy and thus fails to provide any reasonable basis that the addition and optimization of O₂ content in an alloy including a high amount (0.4 to 0.7%) of Mn would be desirable or would behave in a predictable way. Moreover, JP '814 teaches a process in which O₂ is not only added, but balanced with S and then treated with Al to provide increased graphitization and a high impact toughness. Thus reading the disclosure of JP '814 in its entirety would suggest not only the

addition of O₂ but also the addition of Al to achieve the desired results. As Applicants achieve their desired pearlite structure with increased graphitization/greater tensile strength (i.e. high impact toughness) without adding or treating with Al, Applicants submit that the lack of Al in Applicants' claimed cast iron material is an indicia of unobviousness according to MPEP 2144.04 II further supporting patentability of Applicants' claim 1.

As the other references cited, Ecob, SU '460, and Derwent publication NL 150847, were presented with respect to optional elements of Applicants claimed cast iron material, these references provide no further insight to why one of skill in the art would have modified the teachings of either EP '071 or EP '789 to include both a high Mn content while also including an optimized O₂ range. (None of Ecob, SU '460, and Derwent publication NL 150847 teach the addition of O₂ to their iron alloys.) Thus, Applicants respectfully submit that claim 1 is patentable in view of any combination or single citation of EP '071, EP'789, JP '814, Ecob, SU '460, and Derwent publication NL 150847 as none of these references provide the required reasoning to combine/modify the prior art to achieve Applicants' cast iron material having a high Mn content in combination with an O₂ range of 0.003% to 0.007% to obtain the desired structure and properties without the addition of Al. Since claims 2-19 depend either directly or indirectly from Applicants' independent claim 1, Applicants submit that claims 2-19 are also patentable over these references for the foregoing reasons.

CONCLUSION

In view of the foregoing, Applicants respectfully submit that claims 1-19 are in condition for allowance and request favorable action. The Examiner is welcome to contact Applicants' attorney at the number below with any questions.

Respectfully submitted,

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